



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,966	08/21/2003	Koji Nakazawa	101175-00034	7581

4372 7590 04/19/2007
ARENT FOX PLLC
1050 CONNECTICUT AVENUE, N.W.
SUITE 400
WASHINGTON, DC 20036

EXAMINER

ZHENG, LOIS L

ART UNIT	PAPER NUMBER
----------	--------------

1742

*SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/644,966	Applicant(s) NAKAZAWA ET AL.	
	Examiner Lois Zheng	Art Unit 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Claim 6 is amended in view of the amendment filed 26 January 2007. Claim 4 is canceled. Therefore, claims 1-3 and 5-10 remain under examination.

Status of Previous Rejections

2. The rejection of claims 6-10 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement, is withdrawn in view of applicant's claim amendments filed 26 January 2007.

Status of the Present Office Action

3. Upon further review and search, new rejection ground for claims 6-10 has been established as set forth in paragraph 6 below. Therefore, this Office Action is **Non-Final**.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moulthrop, Jr. et al. US 6,383,361 B1 (Moulthrop) in view of Cisar et al. US 5,635,039 (Cisar), and further in view of Casson US 3,720,164 (Casson).

Art Unit: 1742

Moulthrop teaches a water electrolysis system comprising an electrolysis cell stack(Fig. 4 numeral 61), an oxygen/water separation tank(Fig. 4 numeral 100) and a phrase separation tank(Fig. 4 numeral 82).

Regarding claim 1, the electrolysis cell stack of Moulthrop reads on the claimed water electrolysis means. The oxygen/water separation tank of Molthrop reads on the claimed gas/liquid separation means. Moulthrop further teaches that the water exiting from the phrase separation tank is pumped back into the electrolysis cell(Fig. 4 numerals 102, 72 & 94, col. 4 lines 36-38). Therefore, pumps 102 & 72 as shown in Fig. 4 of Moulthrop read on the claimed backflow means. Moulthrop further teaches that the oxygen/water exiting from the electrolysis cell stack is introduced to the oxygen/water separation tank(Fig. 4 numerals 98 & 100, col. 4 lines 40-42). Therefore, the claimed discharge open is inherently present in the cell stack of Moulthrop. The oxygen/water separation tank(i.e. gas/liquid separation means) of Moulthrop is directly connected to the discharge opening through which the oxygen/water mixture is brought out from the cell stack(i.e. water electrolysis means).

However, Moulthrop does not explicitly teach the water electrolysis cell stack comprises the claimed pair of catalyst layers separated by an electrolyte membrane. Moulthrop also does not explicitly teach no intermediate piping for the gas/liquid mixture of oxygen and pure water brought out from the water electrolysis means. Moulthrop also does not explicitly teach the claimed pure water intake opening on the gas/liquid separating means.

Cisar teaches an electrochemical cell that can be used as a water electrolyzer (abstract, col. 1 lines 19-21, col. 28, lines 31-43). Cisar further teaches a pair of catalyzed electrodes separated by a proton exchange membrane(col. 5 line 62-col. 6 line 3, col. 8 line 20 – col. 9 line 32). Cisar further teaches a gas/liquid separator tank downstream from the water electrolyzer with an intake opening for makeup deionized water(Fig. 6 numerals 74 and 86, col. 18 lines 31-36).

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the pairs of catalyzed electrodes separated by a proton exchange membrane as taught by Cisar into the water electrolysis system of Moulthrop in order to increase the performance of the electrochemical cell by as taught by Cisar(col. 9 lines 10-12). It would also have been obvious to one of ordinary skill in the art to have incorporated deionized water intake opening on the gas/liquid separator tank as taught by Cisar into the oxygen/water separation tank of Moulthrop in order to supply the makeup deionized water(i.e. mint pure water) to the electrolysis system as taught by Cisar.

Casson teaches using purified water in making corrosion resistant metallic lithographic plates(abstract). Casson further teaches that metal pipings and vessels can cause contaminations to the water(col. 4 lines 8-11).

Regarding the “intermediate piping” limitation, Moulthrop is silent about any intermediate piping between the electrolysis cell stack and the oxygen/water separation tank. Therefore, the examiner asserts that the oxygen/water mixture directly flows into the oxygen/water separation tank through the discharge opening without intermediate

Art Unit: 1742

piping as claimed. Even if Moulthrop were to disclose the intermediate piping, it would have been obvious to one of ordinary skill in the art to have eliminate any possible intermediate piping between the water electrolysis cell and the gas/liquid separation means as taught by Moulthrop in view of Cisar in order to avoid any potential contamination of the water from the piping as taught by Casson.

In addition, the examiner is interpreting the claimed water electrolysis system as a one-piece system since both the claimed gas/liquid separating means and the electrolysis cell share a common wall. Therefore, one of ordinary skill in the art would have found the claimed one piece water electrolysis system an obvious engineering choice since the claimed water electrolysis system is simply a result of integrating the separate water electrolysis cell and the gas/liquid separation means as taught in the apparatus of Moulthrop in view of Cisar and Casson. In re Larson, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965). See 2144.04(V).

Furthermore, the claimed language "electrolyzes pure water supplied to said catalyst layers, and brings out hydrogen from one catalyst layer and brings out a gas/liquid mixture of oxygen and pure water from the other catalyst layer;" is interpreted as process limitations, therefore, does not lend patentability to instant claim 1. The water electrolysis system of Moulthrop in view of Cisar and Casson is inherently capable of performing the claimed process limitations since Moulthrop in view of Cisar and Casson teach a water electrolysis system that is the same as that of the instant invention.

Art Unit: 1742

Regarding claim 2, Moulthrop further teaches that the gas phrase separation tank(Fig. 4 numeral 82) comprises ion exchange resin(Fig. 3 numeral 81) to remove any cationic and anionic impurities(col. 3 lines 11-17, col. 4 lines 32-33). Therefore, the ion exchange resin containing gas phrase separation tank as taught by Moulthrop in view of Cisar and Casson reads on the claimed purifying means for purifying water with the aid of ion exchange resin wherein the purified water is flown back to the water electrolyzer.

Regarding claim 3, the examiner is interpreting the claimed water electrolysis system as a one-piece system since the claimed the electrolysis cell, the claimed gas/liquid separating means and the claimed gas phrase separation tank(i.e. purifying means) share common walls. Therefore, one of ordinary skill in the art would have found the claimed one piece water electrolysis system an obvious engineering choice since the claimed water electrolysis system is simply a result of integrating the water electrolysis cell, the oxygen/water separation tank(i.e. gas/liquid separation means) and the gas phrase separation tank(i.e. purifying means) as taught in the apparatus of Moulthrop in view of Cisar and Casson. In re Larson, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965). See 2144.04(V).

In addition, one of ordinary skill in the art would have found it obvious to place the purifying means of Moulthrop in view of Cisar and Casson next to the electrolysis cell, thereby sharing a common wall with the electrolysis cell, in order to eliminate the need for an intermediate piping to avoid potential contamination from the piping over time as taught by Casson.

Regarding claim 5, Moulthrop further teaches that the gas phrase separation tank(i.e. purifying means) comprises a filter medium(Fig. 3 numeral 84). Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the filter medium in the gas phrase separation tank of Moulthrop into the oxygen/water separation tank of Moulthrop in view of Cisar(i.e. gas/liquid separation means) in order to sufficiently removing particulates in the water such that the re-circulated water will not contaminate the electrochemical cell as taught by Moulthrop(col. 3 lines 19-23).

6. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki et al. US 5,484,512(Sasaki) in view of Casson US 3,720,164(Casson).

Sasaki teaches a water electrolysis system comprising:

- a. a water electrolyzer(Fig. 3 #17) including a pair of anode and cathode separated by an ion exchange membrane(col. 5 lines 13-17, col. 8 lines 9-11),
- b. a gas scrubber(Fig. 3 #16) for separating oxygen and water from the electrolyzer, wherein the gas scrubber is directly connected to a discharge opening of the water electrolyzer and is equipped with a pure water intake opening, and
- c. a recycle line (Fig. 3) for returning water separating by the gas scrubber and the pure water intake from the gas scrubber back to the water electrolyzer.

Regarding claim 1, the water electrolyzer as taught by Sasaki reads on the claimed water electrolysis means. The gas scrubber as taught by Sasaki reads on the claimed gas/liquid separating means, and the recycle line as taught by Sasaki reads on the claimed backflow means.

Art Unit: 1742

However, Sasaki teaches using stainless steel piping material transporting gas/liquid mixture(col. 5 lines 29-32) and does not teach the claimed discharge of gas/liquid from the electrolyzer to the gas scrubber without intermediate piping.

Casson teaches using purified water in making corrosion resistant metallic lithographic plates(abstract). Casson further teaches that metal pipings and vessels can cause contaminations to the water(col. 4 lines 8-11).

Therefore, it would have been obvious to one of ordinary skill in the art to have eliminate the metal intermediate piping between the water electrolyzer and the gas scrubber of Sasaki in order to avoid any potential contamination of the water from the piping as taught by Casson.

7. Claims 2-3 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki in view of Casson, and further in view of Moulthrop.

The teachings of Sasak in view of Casson are discussed in paragraph 6 above. However, Sasaki in view of Casson do not explicitly teach the claimed purifying means for purifying water made to flow back to the electrolyzer.

The teachings of Moulthrop are discussed in paragraph 5 above. Moulthrop further teaches that the gas phrase separation tank(Fig. 4 numeral 82) comprises ion exchange resin bed(Fig. 3 numeral 81) to remove any cationic and anionic impurities prior to water being returned back to the electrolyzer(col. 3 lines 11-17, col. 4 lines 32-33). Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the ionic exchange resin bed as taught by Moulthrop into the gas scrubber

Art Unit: 1742

of Sasaki in view of Casson in order to remove any cationic and anionic impurities prior to water being returned back to the electrolyzer as taught by Moulthrop.

Regarding claims 2 and 5, the ion exchange resin bed in the gas scrubber of Sasaki in view of Casson and Moulthrop reads on the claimed purifying means as recited in claim 2 and the claimed filter means as recited in claim 5.

Regarding claim 3, the examiner is interpreting the claimed water electrolysis system as a one-piece system since the claimed the electrolysis cell, the claimed gas/liquid separating means and the claimed gas phrase separation tank(i.e. purifying means) share common walls. Therefore, one of ordinary skill in the art would have found the claimed one piece water electrolysis system an obvious engineering choice since the claimed water electrolysis system is simply a result of integrating the individual pieces of equipment in the apparatus of Sasaki in view of Casson and Moulthrop together. In re Larson, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965). See 2144.04(V).

In addition, since the gas scrubber as taught by Sasaki in view of Casson and Moulthrop is connected to the electrolyzer without intermediate piping, the gas scrubber of Sasaki in view of Casson and Moulthrop would have been positioned next to the electrolysis cell, thereby sharing a common wall with the electrolysis cell. Since Sasaki in view of Casson and Moulthrop further teach that the gas scrubber comprises an ion exchange resin bed to remove impurities, the ion exchange resin bed(i.e. purifying means) as taught by Sasaki in view of Casson and Moulthrop would have be sharing a

Art Unit: 1742

common wall with the water electrolyzer of Sasaki in view of Casson and Moulthrop as claimed.

Regarding claim 6, the instant claim is partially rejected for the same reasons as stated in the rejection of claims 1-2 above. In addition, the ion-exchange resin bed(i.e. purifying means) as taught by Sasaki in view of Casson and Moulthrop is only in fluid communication with the water electrolyzer via the recycle line(i.e. backflow means) and the gas scrubber(i.e. gas/liquid separating means), which meets the limitations of the instant claim.

Regarding claims 7 and 10, the instant claims are rejected for the same reasons as stated in the rejection of claims 2 and 5 above.

Regarding claim 8, the instant claim is rejected for the same reasons as stated in the rejection of claim 3 above.

Regarding claim 9, Sasaki teaches the claimed pure water intake opening in the gas/liquid separation means(Fig. 3 #16) as claimed.

Response to Arguments

8. Applicant's arguments filed on 26 January 2007 have been fully considered but they are not persuasive.

In the remarks, applicant appears to allege that several agreements were reached between during the personal interview held January 9, 2007. However, the examiner cannot concur with applicant that these agreements reached during the personal interview. In fact, the Interview Summary dated January 9, 2007 indicates agreement with respect to the claims was not reached.

Art Unit: 1742

After reviewing applicant's remarks, the examiner agrees with the applicant on following comments:

- The amendment to claim 6 renders claim 6 in conformity with the requirements of 35 U.S.C. 112, first paragraph. Therefore, the previous rejections of claims 6-10 under 35 U.S.C. 122, first paragraph, has been withdrawn.
- Moulthrop fails to teach the claimed direct connection of gas/liquid separating means to the water electrolysis means without any intermediate piping.

However, the examiner does NOT agree that the deficiencies of Moulthrop cannot be cured by Ciser and Casson. Ciser is incorporated into the apparatus of Moulthrop because Ciser teaches claimed intake opening for pure water in the gas/liquid separation means downstream from the electrolysis cell. Casson is incorporated into the apparatus of Moulthrop in view of Ciser because Casson teaches away from using metal piping due to its corrosion to water over time, which provides proper motivation to remove the piping between the electrolyzer and the gas/liquid separation means in the apparatus of Moulthrop in view of Ciser, which is to avoid contamination of water due to corrosion.

Furthermore, applicant's argument that the claimed apparatus is simplified in comparison to the apparatus of Moulthrop in view of Ciser and Casson is not persuasive since Moulthrop in view of Ciser and Casson teach an electrolysis apparatus that is structurally the same as the instantly claimed apparatus. In addition, the instant claims uses open-ended transitional phrase "comprising" which allows the presence of

Art Unit: 1742

additional components/equipment in the claimed apparatus. Therefore, the examiner cannot determine if the apparatus as claimed is indeed structurally simpler than the apparatus of Moulthrop in view of Ciser and Casson.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lois Zheng whose telephone number is (571) 272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LLZ

ROY KING
SUPERVISORY PATENT EXAMINER
TECHNICAL CENTER 1200